

May 16, 2005

Contact: Allyson Gamble, (801) 537-9156 or (801) 230-4755 (cell)
Capitol Preservation Board

Contact: Jack Wixom, (801) 983-5104 or (801) 201-4817 (cell)
Jacobsen/Hunt Joint Venture

Capitol Fact Sheet

How large is the Capitol?

The building includes 320,000 square feet. It is 404 feet long, 240 feet wide and 283 feet high at the top of the cupola on the dome.

How much does it weigh?

The Capitol's total weight at the beginning of construction was 130,000,000 pounds. We will be adding an additional 30,000,000 million pounds of concrete steel and additional stone.

How much new concrete will be placed at the Capitol?

There will be 30,000 cubic yards of new concrete placed to seismically stabilize the building. That is enough concrete to create a sidewalk stretching from the Capitol to its original Territorial Capitol in Fillmore, Utah, 150 miles away.

What kind of a structure supports the Capitol?

The Capitol is supported by an steel-reinforced concrete column and beam structural frame. It was one of the first of its kind in the area when originally constructed in 1914. Each column in that frame supports 20,000 to 600,000 pounds. In engineering terms that is about 20 to 600 Kips. Kip is a measure meaning one thousand pounds. Each column is supported by a footing.

A point of interest came when the portions of footings on the building's west basement were found not to include steel reinforcing. The columns for each of those footings had to be re-engineered to meet the anticipated loads, using supporting steel jackets.

What is significant about today's installation?

Today signals the start of the very technical work of Capitol restoration. We have been working hard for the last eight months to prepare for this critical phase. For the next several months we will be installing the key components to the Capitol seismic stabilization effort. This is the first of 265 base isolator bearings and 15 sliders that will support the structural columns.

What is base isolation?

Seismic Isolation is a state-of-the-art design strategy that effectively de-couples a building from the ground thereby limiting the damaging horizontal components of earthquake ground motions.

What do the Capitol base isolators look like?

The base isolator bearings are cylindrical with diameters ranging from 36 to 44 inches with a height of about 20 inches. The bearings are designed to sit at the base of the building vertical columns. Each isolator consists of a series of rubber and steel plates stacked around an energy-absorbing lead core. The base isolator will dramatically reduce – not eliminate – an earthquake's impact. Earthquake forces may be reduced by factors of 5 to 10. An 8.0 earthquake, for example, would seem like a much less damaging 5.5 event.

How does a base isolator work?

When the lateral force of an earth quake pushes against the isolator, the isolator stretches in an oblique shape in any horizontal direction. They do this without losing the ability to support the structural column above. So rather than shaking apart, the Capitol would move back and forth on the isolator bearings to reduce the impact of the earthquake forces on the structure.

How do you know base isolators will work?

Base isolators have been successfully used in Japan, California and a number of other highly seismically active areas. The largest base-isolated building in the world is West Japan Postal Computer Center. It is located in Sanda, Kobe Prefecture, Japan. This six-story, 47,000 meter square (500,000 sq. ft.) structure is supported on 120 elastomeric isolators with a number of additional steel and lead dampers. It was about 19 miles from the epicenter of the 1995 Hyogoken Nanbu (Kobe) earthquake and experienced severe ground motion during the quake. The peak ground acceleration was reduced by the isolation system. An adjacent building to the computer center experienced some damage, but there was no damage to the isolated structure.

Is Base Isolation being used elsewhere currently?

To date 45 base-isolated buildings in the U.S. are planned, under construction, or completed. The Salt Lake City and County Building has a similar system. It was placed in 1987. At the time, it was the first base isolation retrofit in the world.

How many isolators will be used in the Capitol?

There will be 280 used in the capitol. Not every column will have a base isolator, since there are 380 columns. By sharing loads and using sliders, a less technical system, the entire Capitol will be protected.

How long will it take to install all of the isolators?

We will be installing isolators and sliders through October 2006. Each isolator is left secured and rigid when placed. After all are all installed, they will all be released and activated in about two days.

How are isolators put into place?

1. The load from a column is first transferred away from the column by using a system of transfer beams and temporary jacks.
2. The column is then cut and removed to allow a place for the base isolator.
3. The column footing is then replaced and the isolator placed in the gap, bolted to the column and the footing.
4. Any remaining space is then filled, using a flat jack that is inflated using water to transfer the load of the column onto the new mat footing.
5. Later, the water in the flat jack is transfused with epoxy under full load for permanent structural support.

What is a slider and how is it different from a base isolator?

A slider is a simpler form of bearing, consisting of Teflon-coated steel plates that slide on each other. It is used in those locations where the columns are not carrying the extreme loads supported by base isolators.

How many sliders are being used?

We have planned for 15 sliders, strategically placed throughout the building where the weight control is not as critical.

Why is the Capitol seismic upgrade being done now?

History shows a pattern of major seismic events occurring here in the area about every 1300 years. It has been about that much time since the last one occurred. We want to be prepared to protect those who work in and around the Capitol and those who may be visiting. It is not a matter of if a major earthquake will occur, but rather when one of that magnitude will occur.

Will the base isolators still be functional following a major seismic event, or will they all need to be replaced?

The elastic construction of the isolator is designed to endure through a seismic event and return to its original form. Following an event, each isolator will need to be examined. A replacement could be accomplished if an isolator is damaged.

How did the Jacobsen/Hunt construction team learn how to do base isolation?

Both companies have significant prior experience. Jacobsen performed the world's first base isolation of an historic structure, when it renovated the Salt Lake City and County Building in 1987. Hunt recently completed the restoration of the San Francisco City Hall, a building that looks much like the Capitol. Bringing that past experience of both companies to the State Capitol has been a great asset to the project.

What else will be done to protect the Capitol?

New exterior and interior shear walls will be added to the structure to make it better able to stand the shear (lateral forces) caused by a seismic event. This will make the building function more as a single mass. All the columns and exterior decorations will also be better tied to the structure and supported to prevent tipping or falling in an earthquake.

How much will the project cost in total?

The Capitol restoration and base isolation project has a budget of \$200 million. This is funded by the Legislature in appropriations directly to the Capitol Preservation Board. The appropriation has been provided in pieces, to meet the costs incurred between legislative sessions. So far the Utah Legislature has appropriated \$110 million of the total budget.

How long will it take?

The entire project is schedule to complete in November 2007, to be occupied in time for the 2008 legislative session.

If the Capitol was not safe, why didn't the state tear it down and build a new one?

Three key reasons:

- Replacing the building would have been far more costly than the restoration

- It's style, design and materials could not have been procured for anything close to the cost

- The Capitol stands as a public icon, and symbol of the State's history and its commitment to freedom and solid government